

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 7907-4 (1987): Helical Extension Springs, Part 4:
Selection of Standard Cold Coiled Springs Made from
Circular Section Wire and Bar [TED 21: Spring]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



Indian Standard

SPECIFICATION FOR HELICAL EXTENSION SPRINGS

PART 4 SELECTION OF STANDARD COLD COILED SPRINGS MADE FROM CIRCULAR SECTION WIRE AND BAR

1. Scope — Covers various parameters of cold coiled extension springs of various sizes for selection of the designer and the user.

2. Terminology — Following symbols and units shall apply (see Fig. 1).

D_o = outside coil diameter, mm

d = wire or rod diameter before coiling into spring, mm

L_o = length of unloaded spring, mm

F_n = spring force, correlated to the spring length, N

F_o = initial tension, N

L_n = maximum permissible test length, mm

R = spring rate, N/mm

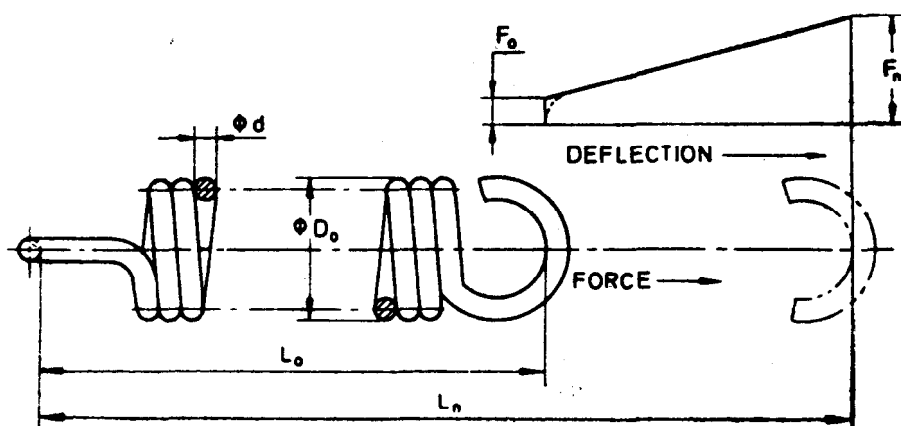


FIG. 1 THEORETICAL EXTENSION SPRING DIAGRAM

3. Dimensions and Designation

3.1 Dimensions shall be as given in Table 1.

3.2 Designation — Extension spring with wire dia $d = 0.20$ mm, outside diameter $D_o = 1.60$ mm, and length $L_o = 6.4$ mm shall be designated as:

Extension Spring $0.20 \times 1.60 \times 6.4$ — IS : 7907

4. Material — Spring steel wire conforming to Grade 2 of IS : 4454 (Part 1)-1981 'Specification for steel wires for cold formed springs: Part 1 Patented and cold drawn steel wires—unalloyed (second revision)', shall be used. If long life is required, superior material is to be used.

TABLE 1 DIMENSIONS OF EXTENSION SPRINGS

(Clause 3.1)

Sl No.	D ^o mm	d mm	L _o mm	F _n N	F _o N	L _n mm	R N/mm
1	1.60	0.18	6.4	1.42	0.137	13.7	0.18
2			7.9			18.5	0.12
3			9.6			23.6	0.09
4			11.2			28.4	0.07
5			12.7			33.3	0.07
6		0.20	6.4	2.00	0.176	11.7	0.35
7			7.9			15.2	0.24
8			9.6			19.0	0.20
9			11.2			23.1	0.16
10			12.7			26.7	0.12
11			15.7			34.0	0.11
12			19.0			41.6	0.09
13		0.22	6.4	2.76	0.265	10.2	0.65
14			7.9			13.2	0.47
15			9.6			16.5	0.37
16			11.2			19.6	0.29
17			12.7			22.9	0.24
18			15.7			28.7	0.20
19			19.0			35.6	0.16
20	2.39	0.25	9.6	0.67	0.225	21.3	0.21
21			11.2			26.2	0.16
22			12.7			31.2	0.14
23			15.7			40.6	0.11
24			19.0			50.8	0.07
25			22.4			59.1	0.06
26			25.4			68.3	0.05
27		0.28	9.7	3.11	0.265	18.2	0.33
28			11.2			22.2	0.26
29			12.7			26.1	0.22
30			15.7			34.1	0.16
31			19.1			42.7	0.12
32			22.4			51.2	0.10
33			25.4			59.2	0.09
34		0.30	9.6	4.45	0.441	16.8	0.56
35			11.2			20.8	0.42
36			12.7			24.1	0.35
37			15.7			31.0	0.26
38			19.0			38.1	0.21
39			22.4			46.2	0.18
40			25.4			53.3	0.14
41		0.32	9.7	5.1	0.441	15.3	0.80
42			11.2			18.4	0.64
43			12.7			21.5	0.52
44			15.7			27.7	0.38
45			19.1			34.4	0.30
46			22.4			41.1	0.24
47			25.4			47.3	0.21
48		0.36	9.6	6.7	0.755	14.5	1.24
49			11.2			17.3	0.96
50			12.7			20.1	0.80
51			15.7			25.6	0.60
52			19.0			31.2	0.47
53			22.4			37.8	0.38
54			25.4			43.2	0.33

(Continued)

TABLE 1 DIMENSIONS OF EXTENSION SPRINGS — *Contd*

SI No.	D° mm	d mm	L_o mm	F_n N	F_o N	L_n mm	R N/mm
55	2.39	0.40	15.7	7.1	0.892	27.2	0.57
56			19.1			34.2	0.43
57			22.4			41.1	0.35
58			25.4			46.0	0.29
59			28.4			52.6	0.24
60			31.8			58.7	0.23
61			34.8			63.3	0.20
62			38.1			71.6	0.18
63		0.45	15.7	9.8	0.892	24.2	1.08
64			19.1			30.2	0.82
65			22.4			36.1	0.66
66			25.4			40.6	0.58
67			28.4			46.0	0.49
68			31.8			51.6	0.44
69			34.8			57.2	0.38
70			38.1			62.7	0.35
71			44.4			73.7	0.29
72			50.8			84.8	0.24
73	3.05	0.50	15.7	13.3	1.33	22.1	1.90
74			19.1			27.4	1.45
75			22.4			32.7	1.18
76			25.4			36.8	1.05
77			28.4			41.6	0.91
78			31.8			46.7	0.78
79			34.8			51.8	0.70
80			38.1			56.6	0.65
81			44.4			66.5	0.54
82			50.8			76.4	0.45
83	4.57	0.56	15.7	11.5	0.892	25.7	1.10
84			19.1			33.4	0.76
85			22.4			41.0	0.59
86			25.4			47.2	0.49
87			28.4			54.1	0.42
88			31.8			61.7	0.35
89			34.8			68.6	0.31
90			38.1			75.9	0.27
91			44.4			90.2	0.23
92			50.8			103.4	0.21
93		0.65	15.7	18.7	1.77	22.4	2.62
94			19.1			28.5	1.85
95			22.4			34.6	1.43
96			25.4			39.9	1.19
97			28.4			45.2	1.03
98			31.8			51.0	0.89
99			34.8			56.9	0.78
100			38.1			62.7	0.70
101			44.4			73.9	0.58
102			50.8			85.3	0.49
103		0.80	15.7	30.2	2.65	20.0	6.6
104			19.1			25.0	4.75
105			22.4			30.0	3.70
106			25.4			34.3	3.12
107			28.4			38.9	2.66
108			31.8			43.7	2.29
109			34.8			48.5	2.03

(Continued)

TABLE 1 DIMENSIONS OF EXTENSION SPRINGS — *Contd*

SI No.	D° mm	d mm	L_0 mm	F_n N	F_0 N	L_n mm	R N/mm
110	4.57	0.80	38.1	30.2	2.65	53.1	1.84
111			44.4			62.5	1.52
112			50.8			71.9	1.31
113			57.2			81.3	1.14
114			63.5			92.2	0.99
115			69.9			101.8	0.88
116	6.10	0.65	15.7	14.7	1.33	23.7	1.70
117			19.1			32.7	0.98
118			22.4			41.7	0.70
119			25.4			50.0	0.53
120			28.4			58.7	0.44
121			31.8			67.0	0.37
122			34.8			75.2	0.31
123			38.1			83.3	0.27
124			44.4			100.3	0.23
125			50.8			116.8	0.20
126		0.75	57.2	20.1	1.79	136.6	0.17
127			63.5			153.9	0.15
128			69.9			171.2	0.13
129			19.1			29.6	1.72
130			22.4			37.2	1.22
131			25.4			44.3	0.96
132			28.4			51.3	0.79
133			31.8			58.9	0.67
134		0.80	34.8	23.6	2.23	65.9	0.59
135			38.1			73.5	0.51
136			44.5			88.1	0.41
137			50.8			102.7	0.35
138			57.2			117.3	0.30
139		0.85	15.7	31.3	2.89	21.2	4.00
140			19.1			28.1	2.41
141			22.4			35.0	1.72
142			25.4			41.6	1.31
143			28.4			48.0	1.14
144			31.8			54.4	0.93
145	0.80	0.80	34.8	23.6	2.23	59.9	0.84
146			38.1			67.0	0.74
147			44.4			80.0	0.60
148			50.8			92.7	0.51
149			57.2			105.7	0.44
150			63.5			118.4	0.38
151			69.9			134.3	0.34
152	0.85	0.85	15.7	31.3	2.89	20.2	6.03
153			19.1			26.3	3.87
154			22.4			32.4	2.79
155			25.4			38.1	2.22
156			28.4			43.7	1.85
157			31.8			49.8	1.56
158	0.85	0.85	34.8	31.3	2.89	55.5	1.36
159			38.1			61.6	1.21
160			44.5			73.3	0.98
161			50.8			85.1	0.82
162			57.2			96.8	0.72
163			63.5			108.6	0.63
164			69.9			120.3	0.56

(Continued)

TABLE 1 DIMENSIONS OF EXTENSION SPRINGS — *Contd*

Si No.	D° mm	d mm	L_0 mm	F_n N	F_0 N	L_n mm	R N/mm
165	6.10	0.95	19.1	38.7	3.56	25.0	6.0
166			25.4			35.6	3.47
167			28.4			40.9	2.87
168			31.8			46.0	2.45
169			34.8			51.0	2.17
170			38.1			55.9	1.96
171			44.4			66.8	1.56
172			50.8			77.2	1.33
173			57.2			87.6	1.14
174			63.5			97.8	1.02
175	7.62	0.95	69.8	32.2	2.89	108.4	0.91
176			76.2			118.6	0.82
177			82.6			131.2	0.74
178			88.9			141.8	0.68
179			25.4			39.5	2.06
180			28.4			46.2	1.64
181			31.8			53.5	1.34
182			34.8			60.1	1.15
183			38.1			67.4	0.99
184			44.5			81.3	0.78
185	9.14	1.25	50.8	69.6	6.25	95.2	0.66
186			57.2			109.2	0.56
187			63.5			123.1	0.49
188			69.9			137.0	0.43
189			76.2			151.0	0.39
190			25.4			32.5	8.9
191			28.4			37.2	7.2
192			31.8			42.4	5.9
193			34.8			47.1	5.1
194			38.1			52.2	4.47
195	9.14	0.80	44.5	16.0	1.33	62.1	3.58
196			50.8			71.9	2.98
197			57.2			81.8	2.56
198			63.5			91.6	2.24
199			69.9			101.5	1.99
200			76.2			111.4	1.78
201			22.1			35.6	1.11
202			25.4			51.3	0.56
203			28.4			63.0	0.42
204			31.8			74.9	0.33
205	9.14	0.95	34.8	26.2	2.23	86.6	0.27
206			38.1			96.8	0.24
207			44.5			122.0	0.19
208			25.4			42.7	1.38
209			28.4			51.8	1.03
210			31.8			60.7	0.82
211			34.8			68.8	0.70
212			38.1			77.7	0.60
213			44.4			95.8	0.48
214			50.8			112.8	0.38
215			57.2			130.6	0.31
216			63.5			147.6	0.27

(Continued)

TABLE 1 DIMENSIONS OF EXTENSION SPRINGS — *Contd*

Sl No.	D ⁿ mm	d mm	L ₀ mm	F _n N	F ₀ N	L _n mm	R N/mm
217	9.14	0.95	60.9	26.2	2.23	168.6	0.24
218			76.2			186.8	0.23
219		1.05	25.4	35.1	3.12	39.4	2.26
220			28.4			47.0	1.74
221			31.8			54.4	1.42
222			34.8			61.7	1.19
223			38.1			60.1	1.03
224			44.4			83.8	0.80
225			50.8			98.8	0.67
226			57.2			114.3	0.56
227			63.5			129.0	0.47
228			69.9			146.2	0.43
229			76.2			161.6	0.38
230		1.10	25.4	45.4	4.00	36.3	3.81
231			28.4			42.9	2.87
232			31.8			49.0	2.38
233			34.8			55.9	1.96
234			38.1			62.7	1.68
235			44.4			75.7	1.31
236			50.8			88.6	1.09
237			57.2			101.6	0.93
238			63.5			114.6	0.80
239			60.8			127.5	0.72
240			76.2			140.5	0.63
241			88.9			170.4	0.52
242			101.6			197.3	0.44
243			114.3			224.3	0.38
244		1.25	25.4	58.9	5.34	33.9	6.3
245			28.4			39.7	4.77
246			31.8			45.9	3.78
247			34.8			51.7	3.18
248			38.1			57.9	2.70
249			44.5			60.9	2.10
250			50.8			82.0	1.72
251			57.2			94.0	1.45
252			63.5			106.0	1.26
253			60.9			118.0	1.11
254			76.2			130.0	1.00
255			88.9			154.1	0.82
256			101.6			178.1	0.70
257			114.3			202.1	0.61
258			127.0			226.2	0.54
259		1.40	25.4	78.2	7.12	31.9	11.3
260			28.4			37.8	8.0
261			31.8			42.2	6.8
262			34.8			47.5	5.6
263			38.1			52.3	4.97
264			44.4			62.5	3.92
265			50.8			72.9	3.18
266			57.2			83.3	2.72
267			63.5			93.5	2.38
268			69.8			103.4	2.10

(Continued)

TABLE 1 DIMENSIONS OF EXTENSION SPRINGS—Contd.

SI No.	D^a mm	d mm	L_0 mm	F_n N	F_0 N	L_n mm	R N/mm
269	9.14	1.40	76.2	78.2	7.12	113.5	1.89
270			88.9			133.8	1.58
271			101.6			154.9	1.35
272			114.3			173.0	1.18
273			127.0			199.4	1.02
274			139.7			220.4	0.91
275			152.4			241.3	0.82
276	10.67	0.95	25.4	23.2	2.14	39.2	1.49
277			28.4			50.4	0.96
278			31.8			62.6	0.69
279			34.8			73.8	0.54
280			38.1			86.0	0.44
281			44.5			109.4	0.32
282			50.8			132.8	0.25
283		1.40	57.2	70.6	6.25	156.2	0.22
284			63.5			179.6	0.19
285			69.9			203.0	0.16
286			76.2			226.5	0.14
287		1.05	25.4	25.8	2.23	31.9	9.9
288			28.4			37.9	6.8
289			31.8			44.4	5.1
290			34.8			50.4	4.12
291			38.1			56.8	3.42
292			44.5			69.3	2.57
293			50.8			81.8	2.06
294		1.10	57.2	33.4	3.12	94.3	1.73
295			63.5			106.8	1.48
296			69.9			119.3	1.29
297			76.2			131.8	1.15
298		1.40	31.8	58.2	5.34	67.3	0.49
299			34.8			81.3	0.37
300			38.1			96.8	0.29
301			44.4			126.5	0.21
302			50.8			155.4	0.17
303		1.27	31.8			59.4	0.84
304			34.8			71.9	0.63
305			38.1			94.3	0.51
306			44.4			109.0	0.35
307			50.8			135.4	0.26
308			57.2			160.0	0.23
309		1.40	34.8	58.2	5.34	65.5	0.98
310			38.1			74.7	0.80
311			44.4			96.3	0.58
312			50.8			117.1	0.45
313			57.2			139.4	0.37
314			63.5			161.4	0.31
315		1.40	34.8			54.4	2.72
316			38.1			61.2	2.28
317			44.4			76.4	1.58
318			50.8			91.4	1.29
319			57.2			109.0	1.07

(Continued)

TABLE 1 DIMENSIONS OF EXTENSION SPRINGS — *Contd*

Sl No.	D^o mm	d mm	L_o mm	F_n N	F_o N	L_n mm	R N/mm
320	12.7	1.40	63.5	58.2	5.34	122.4	0.89
321			69.8			137.4	0.76
322			76.2			152.6	0.69
323			88.9			182.6	0.56
324			101.6			212.8	0.47
325			114.3			242.8	0.40
326			127.0			281.8	0.35
327		1.60	34.8	83.6	7.56	48.8	5.5
328			38.1			55.1	4.46
329			44.4			67.6	3.28
330			50.8			80.3	2.59
331			57.2			92.7	2.14
332			63.5			104.6	1.82
333			69.8			116.8	1.61
334			76.2			129.5	1.42
335			88.9			154.4	1.16
336			101.6			179.6	0.96
337			114.3			204.7	0.84
338			127.0			229.6	0.74
339	16.51	1.40	50.8	44.9	4.00	106.7	0.72
340			57.2			130.3	0.56
341			63.5			177.3	0.45
342			69.8			176.3	0.38
343			76.2			198.9	0.33
344			88.9			244.1	0.26
345			101.6			289.0	0.21
346		1.60	50.8	65.8	6.23	91.7	1.45
347			57.2			109.7	1.12
348			63.5			127.8	0.93
349			69.8			145.8	0.76
350			76.2			163.8	0.67
351			88.9			199.9	0.53
352			101.6			238.0	0.44
353			114.3			272.0	0.37
354		1.70	50.8	88.7	3.56	82.9	2.49
355			57.2			99.2	1.90
356			63.5			115.5	1.54
357			69.9			131.8	1.29
358			76.2			148.1	1.11
359			88.9			180.7	0.87
360			101.6			213.4	0.72
361			114.3			246.0	0.61
362			127.0			278.6	0.53
363	19.05	1.40	50.8	39.2	3.56	110.7	0.58
364			57.2			139.7	0.42
365			63.5			168.6	0.33
366			69.8			197.4	0.26
367			76.2			226.3	0.23
368			88.9			286.5	0.18
369		1.60	50.8	56.9	5.34	95.8	1.14
370			57.2			118.6	0.84
371			63.5			141.2	0.65
372			69.8			159.8	0.56
373			76.2			186.7	0.45

(Continued)

TABLE 1 DIMENSIONS OF EXTENSION SPRINGS — *Contd*

SI No.	D° mm	d mm	L ₀ mm	F _n N	F ₀ N	L _n mm	R N/mm
374	19.05	1.60	88.9	56.9	5.34	229.9	0.35
375			101.6			275.3	0.29
376			114.3			320.8	0.24
377			127.0			366.3	0.21
378		1.90	50.8	92.0	8.45	80.3	2.83
379			57.2			97.3	2.07
380			63.5			114.6	1.63
381			69.8			130.3	1.38
382			76.2			147.3	1.18
383			88.9			180.1	0.91
384			101.6			214.6	0.74
385			114.3			247.4	0.61
386			127.0			280.2	0.54
387			139.7			326.0	0.47
388			152.4			361.4	0.42
389	21.59	1.40	50.8	34.7	3.12	107.2	0.56
390			57.2			143.5	0.37
391			63.5			179.6	0.27
392			69.8			215.9	0.21
393		1.60	57.2	50.2	4.45	124.0	0.69
394			63.5			153.4	0.51
395			69.8			183.1	0.40
396			76.2			212.6	0.33
397			88.9			271.8	0.24
398		1.90	57.2	81.7	7.56	100.8	1.70
399			63.5			119.6	1.31
400			69.8			140.7	1.05
401			76.2			161.5	0.87
402			88.9			201.4	0.67
403			101.6			241.0	0.53
404			114.3			283.0	0.44
405			120.6			301.8	0.40
406			127.0			322.8	0.38
407		2.1	57.2	115.2	10.68	89.4	3.36
408			63.5			106.2	2.45
409			69.8			122.7	1.98
410			76.2			139.4	1.67
411			88.9			170.9	1.27
412			101.6			204.0	1.02
413			114.3			237.2	0.86
414			120.6			253.7	0.78
415			127.0			270.2	0.74
416	25.4	1.60	63.5	43.1	4.00	150.1	0.45
417			69.8			188.0	0.33
418			76.2			225.8	0.26
419			82.6			263.6	0.21
420		1.90	63.5	69.8	6.23	121.2	1.00
421			69.8			148.6	0.80
422			76.2			176.3	0.63
423			88.9			228.3	0.45
424			101.6			280.4	0.35
425			114.3			335.5	0.29
426			127.0			387.6	0.24

(Continued)

TABLE 1 DIMENSIONS OF EXTENSION SPRINGS — *Contd*

Sl No.	D° mm	d mm	L_o mm	F_n N	F_o N	L_n mm	R N/mm
427	25.4	2.1	69.8	98.6	8.90	130.0	1.49
428			76.2			151.4	1.19
429			88.9			191.8	0.87
430			101.6			234.4	0.69
431			114.3			277.4	0.56
432			127.0			320.0	0.47
433		2.40	69.8	131.4	12.1	116.1	2.63
434			76.2			133.1	2.14
435			88.9			168.9	1.52
436			101.6			202.7	1.21
437			114.3			238.5	0.98
438			127.0			272.3	0.84
439			139.7			318.3	0.73
440			152.4			355.7	0.64
441		2.6	69.9	188.0	16.8	104.5	4.94
442			76.2			120.4	3.87
443			88.9			152.1	2.70
444			101.6			183.9	2.08
445			114.3			215.7	1.69
446			127.0			247.5	1.42
447			139.7			279.3	1.22
448			152.4			311.0	1.08
449		2.8	69.9	231.0	21.8	98.2	7.8
450			76.2			112.1	6.1
451			88.9			139.8	4.33
452			101.6			167.6	3.34
453			114.3			195.3	2.72
454			127.0			223.1	2.28
455			139.7			250.8	1.48
456			152.4			278.6	1.75

EXPLANATORY NOTE

This standard is one of the series of standards on design, calculation and specifications of helical coiled springs. Other standards in this series are:

IS : 7906 (Part 1)-1976 Helical compression springs: Part 1 Design and calculations for springs made from circular section wire and bar

IS : 7906 (Part 2)-1975 Helical compression springs: Part 2 Cold coiled springs made from circular section wire and bar

IS : 7906 (Part 3)-1975 Helical compression springs: Part 3 Data sheet for specifications for springs made from circular section wire and bar

IS : 7906 (Part 4)-1987 Helical compression springs: Part 4 Guide for selection of standard cold coiled springs made from circular section wire and bar

IS : 7906 (Part 5)-1979 Helical compression springs: Part 5 Hot coiled springs made from circular section bar

IS : 7906 (Part 6)-1978 Helical compression springs: Part 6 Design and calculations for springs made from rectangular section bar steel

IS : 7907 (Part 1)-1975 Helical extension springs: Part 1 Design and calculation for springs made from circular section wire and bar

IS : 7907 (Part 2)-1976 Helical extension springs: Part 2 Cold coiled springs made from circular section wire and bar

IS : 7907 (Part 3)-1975 Helical extension springs: Part 3 Data sheet for specifications for springs made from circular section wire and bar

This standard aims at rationalization of various sizes of extension springs by eliminating the unnecessary sizes and retaining only those most commonly used in the industry. This standard is expected to be of considerable help to the spring designer who can choose the spring required by him from the list nearest to the characteristic required in the spring designed by him. Some of the most commonly used springs may be available as standard springs stocked by the spring manufacturers.

In this standard, the unit of force used is newton (N).

$$1 \text{ kgf} = 9.80665 \text{ N}$$

$$\approx 9.81 \text{ N}$$

$$= 10 \text{ N (within 2 percent error).}$$